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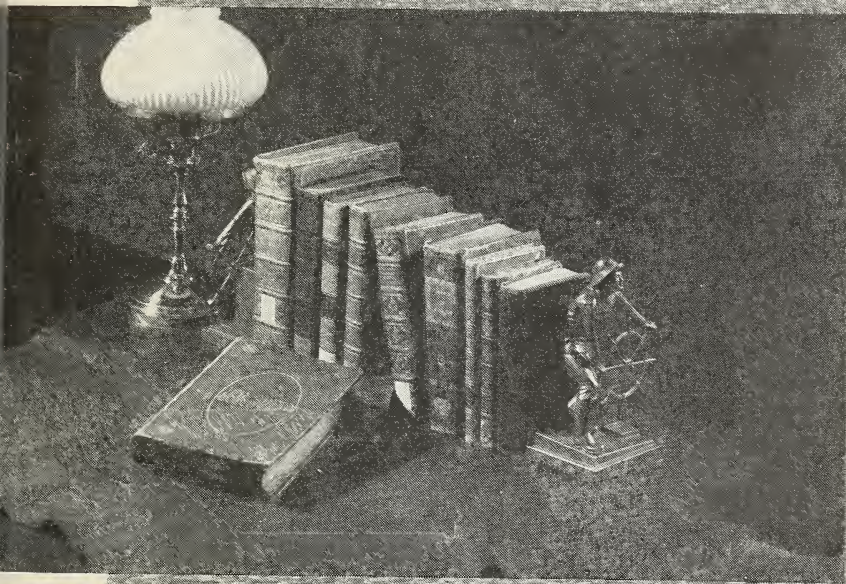


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# Leather Bookbindings



## HOW TO PRESERVE THEM



Leaflet No. 398

UNITED STATES DEPARTMENT OF AGRICULTURE

Research on leather is one aspect of the utilization research conducted by the U. S. Department of Agriculture. The objective is the development of better tanning materials and improved methods of tanning and treating leather to increase its serviceability. The utilization of hides and skins is important to the economy of the livestock industry in the United States.

This leaflet supersedes Leaflet 69, Preservation of Leather Bookbindings.

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# Leather Bookbindings

## HOW TO PRESERVE THEM



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When leather bookbindings decay, some of the first signs may be easily scratched areas, worn corners, and slight cracks in the leather. In later stages, "red rot" appears; the leather is dry, reddish brown, and porous, and tends to peel or powder. The surfaces are scuffed and the bindings are broken along the hinges. Familiar examples of this condition are found in sheep bindings of old law books.

Decayed leather bindings are disagreeable to handle, and they soil the hands and clothes with leather dust. Such bindings must be rebound to be serviceable.

Since frequent rebinding is expensive and inconvenient, ways of preserving leather bindings are important to know. This leaflet describes the advantage of using acid-resistant leather and the effect of dressings, storage, and lacquer treatments on the preservation of bookbindings.

### CAUSES OF DECAY

The chief cause of decay of leather bookbindings is high acidity

in the leather. A secondary cause is lack of oil or grease in the leather.

High acidity in leather is sometimes attributed to the addition of excessive acid during the manufacturing process.

More often, the high acidity is caused by absorption of acidic gases from polluted atmospheres. These acid contaminants are sulfur compounds produced by the burning of coal, gas, or other sulfur-containing materials. When the acidic gases are absorbed, they produce sulfuric acid, which decomposes the leather.

Sometimes lack of oil or grease is due to the fact that too little of it was used during the leathermaking process. Usually, it is caused by a gradual destruction of the oil in leather.

### GUARDING AGAINST DECAY

#### Acid-Resistant Leather

Some of the methods that can be used to make leather acid resistant are: Mineral tanning with chrome or alum salts; vegetable tanning and subsequent mineral retanning; vege-

table tanning and inclusion of a buffering agent.

The buffering agent is usually the sodium or potassium salt of tartaric or lactic acid. It neutralizes the acids that attack the leather.

A type of buffered leather is manufactured in England. It is sold on the guarantee of the British Leather Manufacturers Association that the leather will pass the "NIRA test," which means that the leather has been protected by buffering agents.

Additional information about acid-resistant leathers can be obtained from the U. S. Department of Agriculture, Eastern Utilization Research Branch, Philadelphia 18, Pa.

## Dressings

Dressings do not protect leather against acid decay. Their main purpose is to replace oils or greases lost in use.

Most dressings consist chiefly of oils and greases. Several suitable ones are described in the following sections. The table shows their formulas.

Japan wax and sodium stearate are used in some of the dressings. Japan wax gives body to the preparation and makes it easy to apply uniformly. Sodium stearate has a cleaning action.

Best-quality ingredients must be used; they should be of U. S. Pharmacopoeia grade or of similar quality. They are obtained from local drug stores, wholesale drug supply companies, chemical supply houses, or commercial chemical laboratories. Makers of the various materials are listed in commercial registers.

## Preparing the dressings

The dressings are prepared easily. They can be made by a layman or "farmed out" to a local pharmacist or a commercial chemist.

*No. 1 and No. 2* are emulsions with water and can be made in the same way.

In a double boiler (or on a steam bath) melt together in one container all the ingredients except sodium stearate and distilled water. In another container mix the sodium stearate and water; cover this container and heat gently until the stearate is dissolved. Pour the sodium stearate solution in a thin stream into the melted grease; stir the mixture vigorously as you pour. Allow the thin, milklike mixture to cool; it thickens as it cools. Stir the cold mixture constantly and thoroughly until it is uniform in appearance. If it separates into two layers, stir it more vigorously. The final product should be a smooth, ointmentlike, white to pale cream emulsion.

Keep the preparation tightly covered to prevent evaporation of water and hardening of the dressing. Glass screw-cap jars, like those frequently used for ointments and cold creams, make convenient receptacles.

These preparations provide an even distribution of oil on bindings that are very absorbent.

*No. 3 and No. 4.* In a double boiler (or on a steam bath) heat the ingredients together in one container until all but the sodium stearate powder have melted.

Formulas for Leather Dressings  
(All values are expressed in percent by weight)

| Ingredient                                  | Preparation number |       |       |       |       |       |        |        |
|---|--------------------|-------|-------|-------|-------|-------|--------|--------|
|   | 1                  | 2     | 3     | 4     | 5     | 6     | 7      | 8      |
| Neat's-foot oil, pure, 20°<br>C. cold test. | 25. 0              | ----- | 35. 0 | ----- | 50. 0 | 60. 0 | -----  | -----  |
| Castor oil                                  | -----              | 12. 0 | ----- | ----- | 50. 0 | ----- | -----  | -----  |
| Sperm oil, winter strained.                 | -----              | ----- | ----- | 25. 0 | ----- | ----- | -----  | -----  |
| Lanolin, anhydrous                          | 17. 5              | 30. 0 | 50. 0 | 55. 0 | ----- | 40. 0 | -----  | -----  |
| Japan wax, pure                             | 10. 0              | 5. 0  | 10. 0 | 15. 0 | ----- | ----- | -----  | -----  |
| Sodium stearate, powdered.                  | 2. 5               | 3. 0  | 5. 0  | 5. 0  | ----- | ----- | -----  | -----  |
| Water, distilled                            | 45. 0              | 50. 0 | ----- | ----- | ----- | ----- | -----  | -----  |
| Petrolatum or petroleum<br>jelly, purified. | -----              | ----- | ----- | ----- | ----- | ----- | 100. 0 | -----  |
| Saddle soap (commercial<br>product).        | -----              | ----- | ----- | ----- | ----- | ----- | -----  | 100. 0 |

Pour the mixture on a smooth, non-absorbing surface, such as a piece of plate glass or a marble-, stone-, or glass-topped table. As the mixture cools, "rub in" the small white particles of sodium stearate with a spatula until a uniform, salvelike mixture is obtained. No lumps or white specks should remain in the mixture.

*No. 5* is simply a mixture of equal quantities of neat's-foot oil and castor oil. It is satisfactory for treating bindings that are in good condition. Pure neat's-foot oil can also be used for such bindings.

*No. 6* is a soft salve. In a double boiler warm lanolin gently until it is melted. Add neat's-foot oil and stir thoroughly until the mixture is uniform. Let it cool.

*No. 7* is purified, medicinal-grade petroleum jelly. It should be nearly white or faintly yellow and have practically no odor or taste. It should be chemically neutral; that is, the water extract made by vig-

orously shaking some of the petrolatum with a small quantity of hot distilled water should be neutral (approximately pH 7), as shown by litmus or other suitable indicator.

*No. 8* is saddle soap. It is a commercial preparation designed especially for cleaning leather, but it also aids in lubricating leather.

All the dressings described here have been tested for many years by the Department of Agriculture. *No. 1* and *No. 6* were contributed by the New York Public Library. *No. 1* is used there; it has replaced *No. 6*, which was developed and used there for several years. *No. 7* has been used on law books for more than 40 years by the Worcester County Law Library, Worcester, Mass.

### Applying the dressings

Most leathers, and light-colored leathers in particular, are somewhat darkened by dressings. The finish is dulled. This happens even with colorless or white dressings because



leather absorbs more light after it is oiled than before.

*When to apply.* Treatment should be started when bindings are new and repeated every year or two.

*How much to apply.* Good judgment must be used in applying dressings. How much dressing the leather will absorb depends on the kind of leather and its condition.

Morocco or other goatskin bindings—smooth, hard, shiny leather—absorb the least oil and discolor the least; cowhide and calfskin bindings are intermediate; and sheepskin bindings absorb the most oil and discolor the most.

The more decayed a binding is the more absorbent it is. Badly decayed bindings are impossible to oil uniformly. The middle part of the back between the hinges rots more rapidly than the sides. It usually takes up more dressing and darkens more noticeably. Areas with unequal depth of color are almost inevitable.

*How to apply.* The dressing is applied best in small quantities with the fingers and palm of the hand. As an alternative, use a small swab of cheesecloth, chamois, or felt. With a firm, rapid stroke spread the dressing in a thin film uniformly over as much of the leather at one time as is feasible. Rub the dressing well into the leather until it is completely absorbed. If the leather has a well-pronounced grain, no cloud should remain in the depressions. Allow several hours for the leather to absorb the dressing. Or put the binding in a warm (100° to 115° F.) place for an hour or two; this not only increases the

rate at which the dressing is absorbed but also the quantity absorbed. Repeat the application until no more oil is absorbed.

When the dressing contains water, do not use it directly on gold tooling. Water preparations tend to lift the gold, especially after several applications.

In the New York Public Library, the dressing is applied with a flat varnish brush of appropriate size. The binding is set aside for a few hours or overnight until all the dressing is absorbed. Then the binding is polished with a soft cloth. For added polish, a small quantity of castor oil is applied with a soft cloth and the binding is polished with a chamois or sheep's wool polisher.

*Vellum bindings.*—Use preparation No. 1 or No. 2 to remove dirt from soiled vellum bindings. Rub the dressing into the vellum with a small cloth swab. The yellow discoloration of old vellum extends well into the skin and often through it; the dressing does not remove it. After the binding has been cleaned, apply a final coat of the dressing. It should be very thin because vellums usually absorb little oil or grease.

As an alternative treatment, apply saddle soap, No. 8, with a damp sponge or cloth. It leaves little oil on the surface and has excellent cleaning action.

Direct application of dressing to gold tooling or letters should be avoided.

## Storage

Valuable leather bindings that are not in frequent use may be wrapped in some well-washed fab-





Spraying an acrylic lacquer coating from an aerosol bomb.

ric or stored in tight boxes made of acid-free and acid-resistant materials. Wrapping in newspaper is not advisable, because the ink may smear the binding and newsprint deteriorates rapidly.

## Lacquer Treatment

Lacquer protects leather bindings very well, but it is not used on new books because it destroys the natural leather appearance. Consequently, lacquer is usually used when books have become powdery and are almost ready for rebinding. Lacquered bindings have a slightly shiny finish.

## Preparing the leather

Gently rub the leather surface smooth with crocus cloth or very fine emery cloth. Do this particularly in powdery and scuffed places. Apply oil next, if you wish to oil the leather; the leather cannot be oiled after it is lacquered. Touch up light-colored areas with an al-

coholic solution of a suitable leather dye, if necessary.

## Choosing the lacquer

The lacquer should be one recommended for leather, cloth, or other flexible material. Certain ready-made lacquers, which are available on the market, may be used. Cellulose nitrate and also some of the newer, resin-type lacquers, such as acrylic, are satisfactory to use.

## Applying the lacquer

If the lacquer is available in aerosol bombs, spray it on the leather. Spray a thin coating; let it dry; apply a second coat.

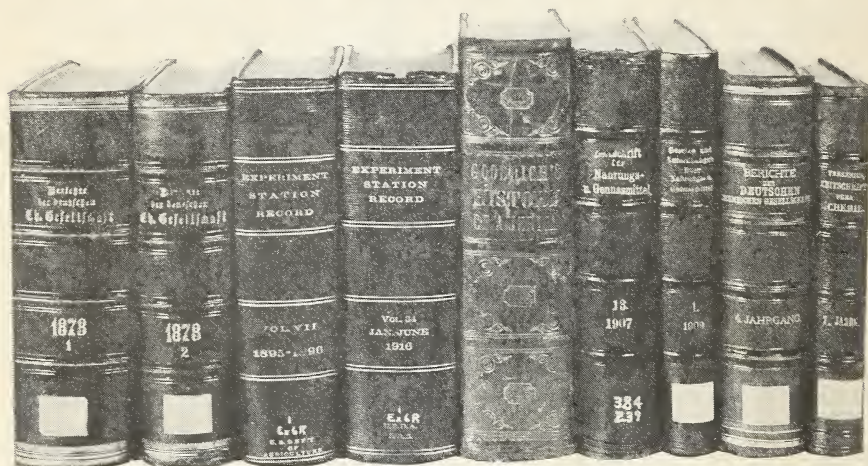
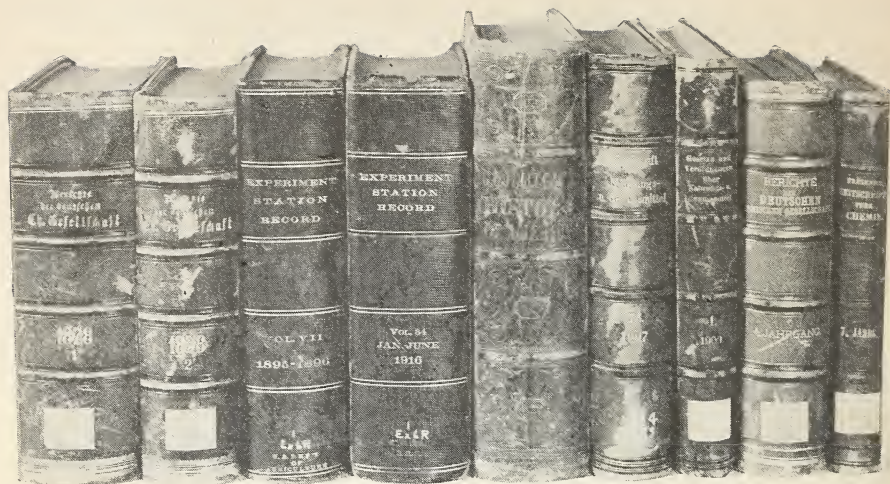
For brush application, thin the lacquer with the thinner that is recommended for the particular lacquer selected. A thin lacquer should be used; a thick application produces a highly varnished appearance and is likely to peel. Select a soft brush about 1 inch wide with hairs set so that they will not be loosened by the lacquer. Flow the lacquer on the leather with one or two strokes; do not spread it by brushing back and forth, because the lacquer may roll up. Always keep the brush full of lacquer. Let the lacquer dry. Apply a second coat if necessary.

Put the lacquer on the titles with one stroke of the brush. This will prevent the lacquer from partly dissolving and spreading the dye in title skivers, especially black skivers.

Clean the brush in thinner immediately. Keep the lacquer tightly sealed when it is not in use.

## Precautions in handling lacquers

Lacquers are very volatile; they dry rapidly and give off a relatively



Above: Old leather bindings in various stages of decay principally due to acid gases in polluted atmospheres. Below: The same volumes after treatment with an acrylic lacquer from an aerosol bomb.

large volume of vapors and fumes in a short time. These vapors ignite easily and burn freely.

Take every precaution against fire and explosion when using lacquers. Apply them in the open or

in a place where fresh air circulates freely. Do not allow the vapors to accumulate.

Do not use lacquers near a fire or an open flame. Do not smoke when handling lacquers.

